June 18, 2003

DMS Progress

- **Address some concerns raised at Temple Review**
- **Cosmic Test Stand**
- **Electronics Design**
- **Progress towards engineering design**

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Concern Raised at Temple Review

- **BTeV observed that their straw tension relaxed when flowing with ethane based chamber gas. Straw would rapidly lose tension during experiment.**

- **BTeV straw:**
  Carbon inner layer, Aluminum middle layer, Kapton outer layer

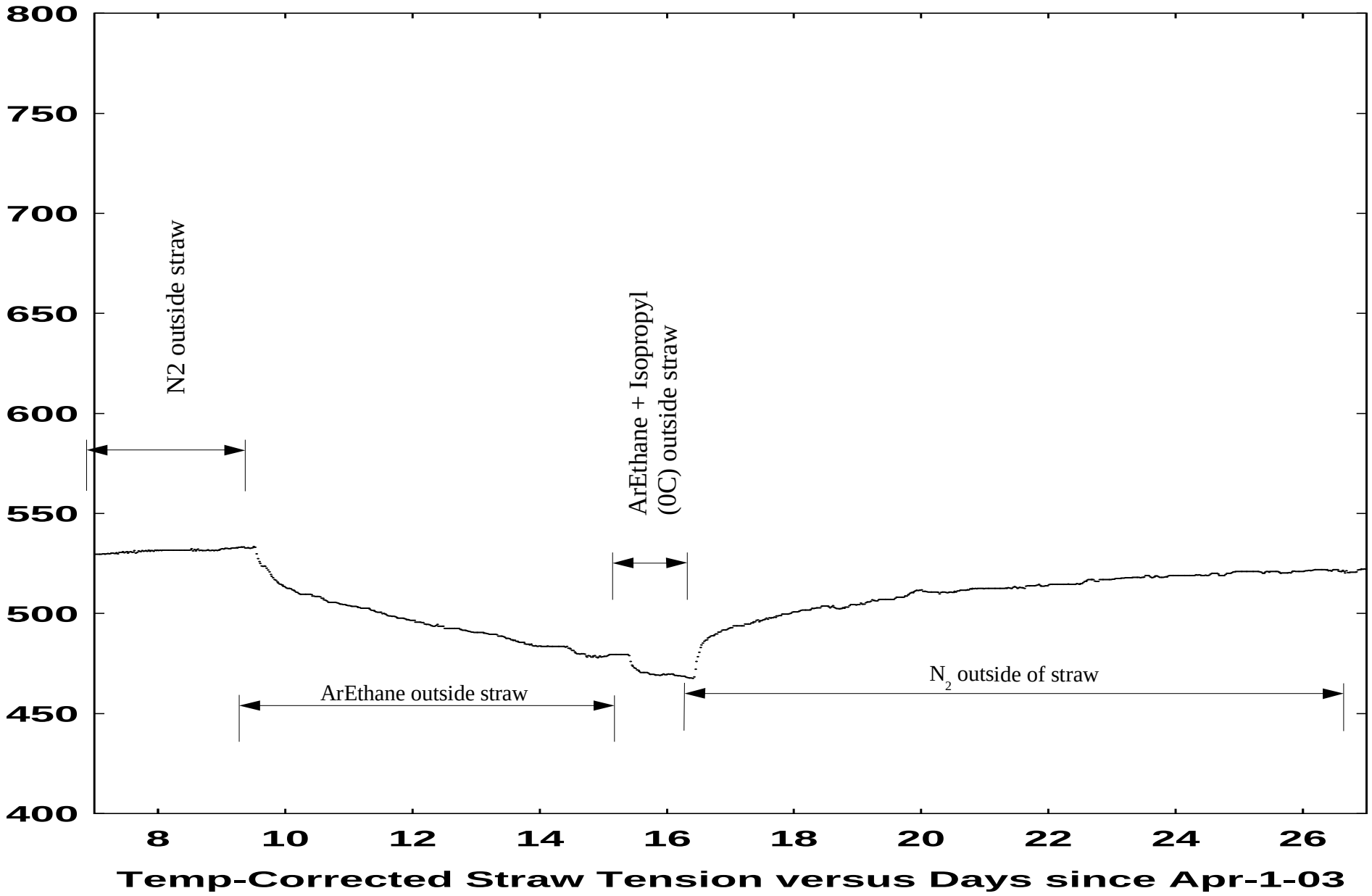
- **CKM straw:**
  Copper inner layer, 2 Kapton outer layers

- **We suspected that Kapton will lose tension if directly exposed to ethane.**

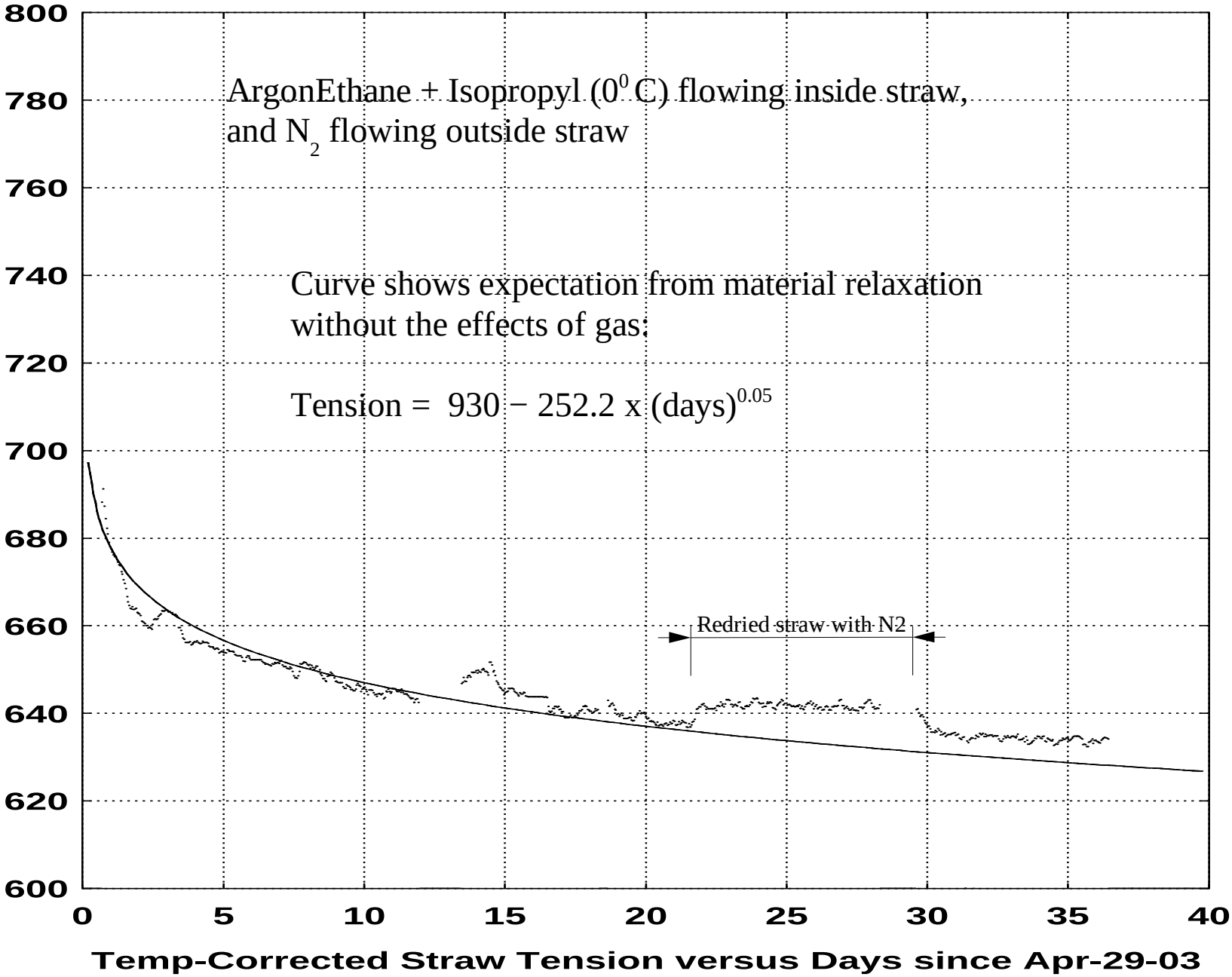
- **But copper inner layer should greatly reduce this effect.**

- **2 month study of this effect. Conclusion: not a problem for us.**

Straw Relaxation: Ethane in Direct Contact with Kapton



Straw Relaxation: Ethane separated from Kapton by Copper Layer



Update of Cosmic Running

Got safety approval to operate with flammable gas in straw in vacuum

Recently received CF4−Ethane

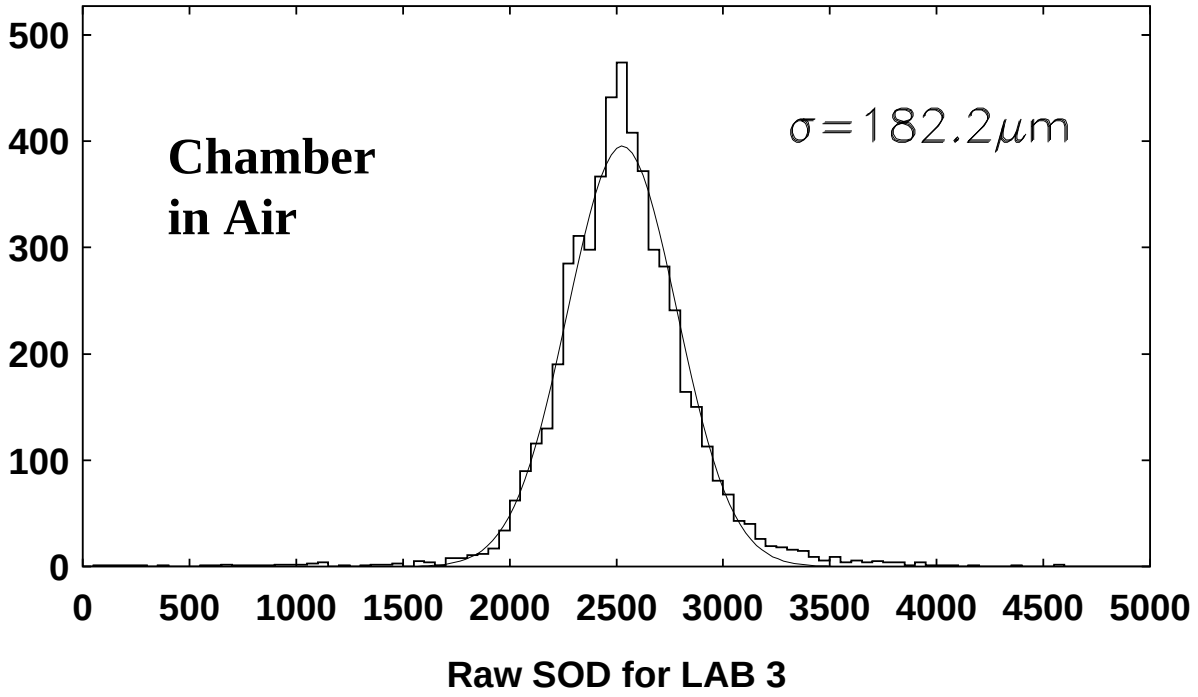
Show results only from ArCO2 and ArEthane

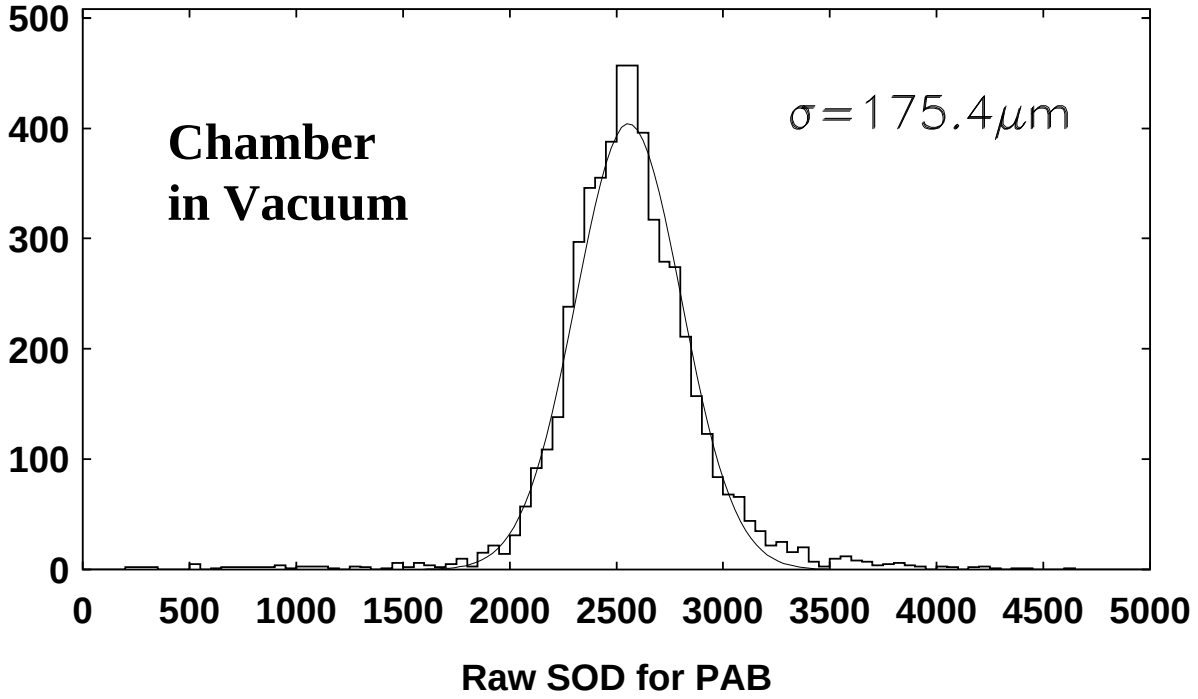
Chamber in air

Chamber in vacuum tank

ArEthane + Isopropyl at 0C

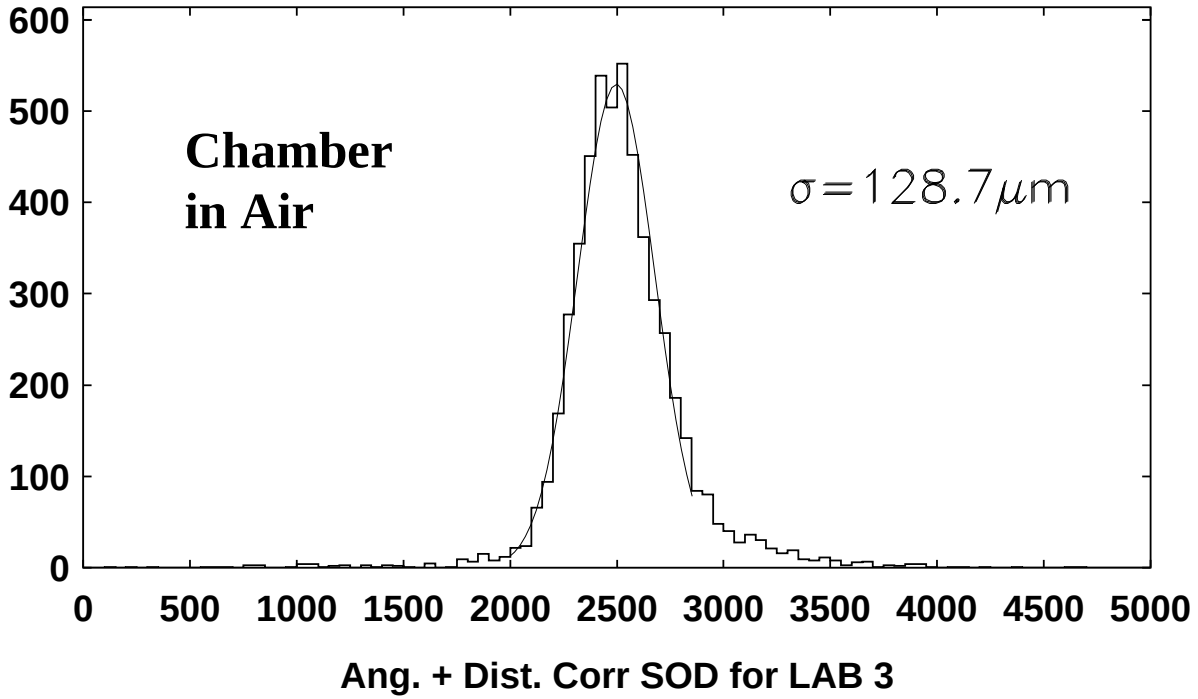
Raw Sum of Distances

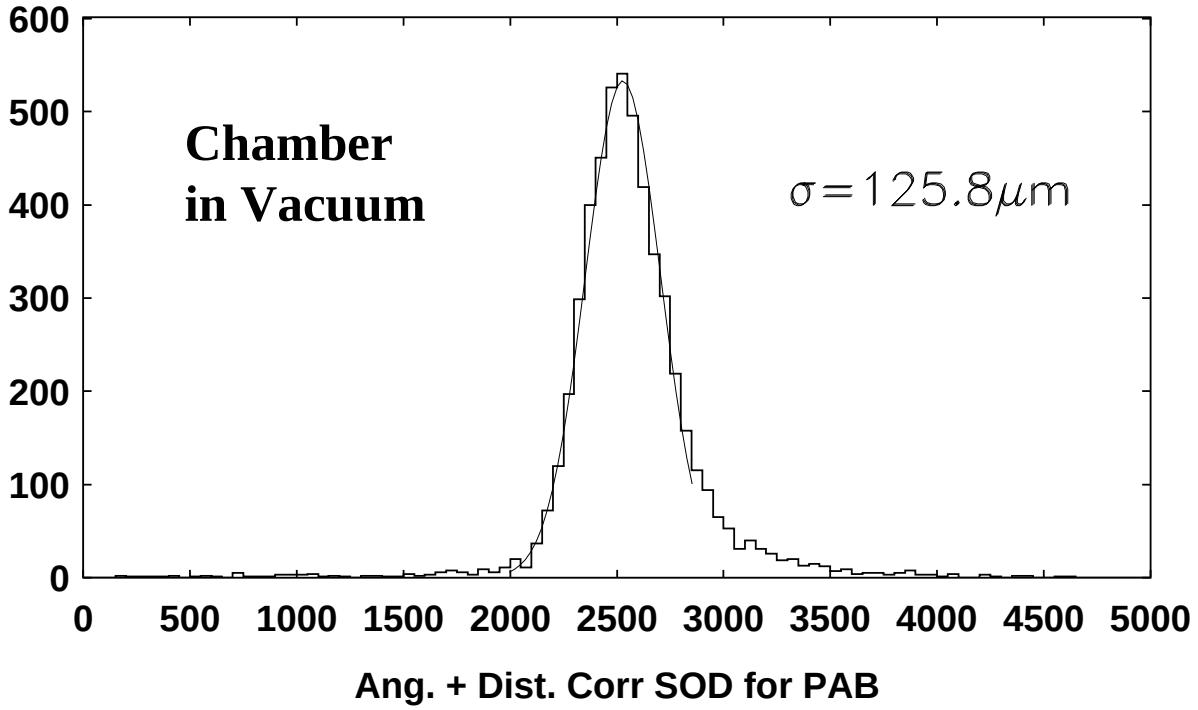


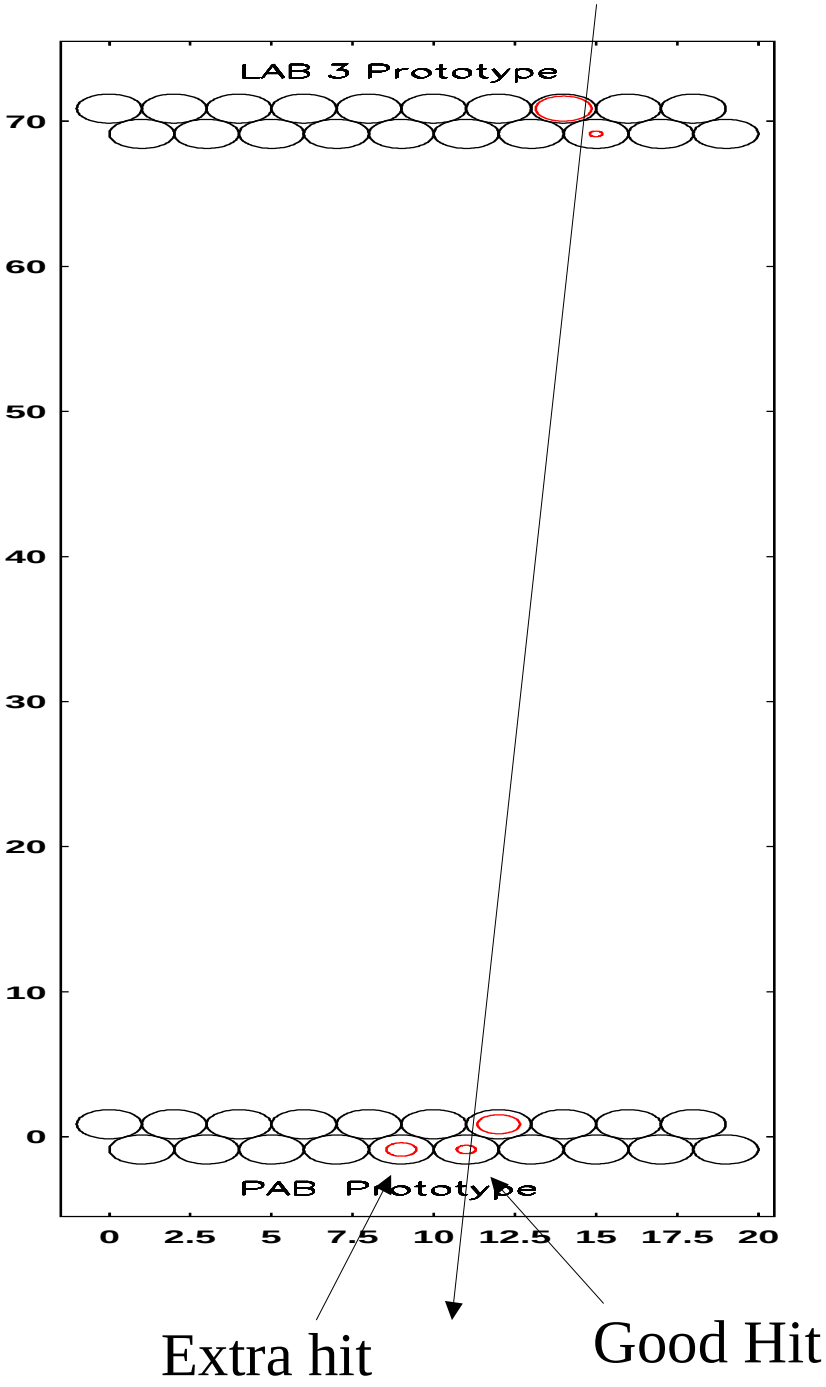


ArEthane + Isopropyl at 0C

Corrected Sum of Distances





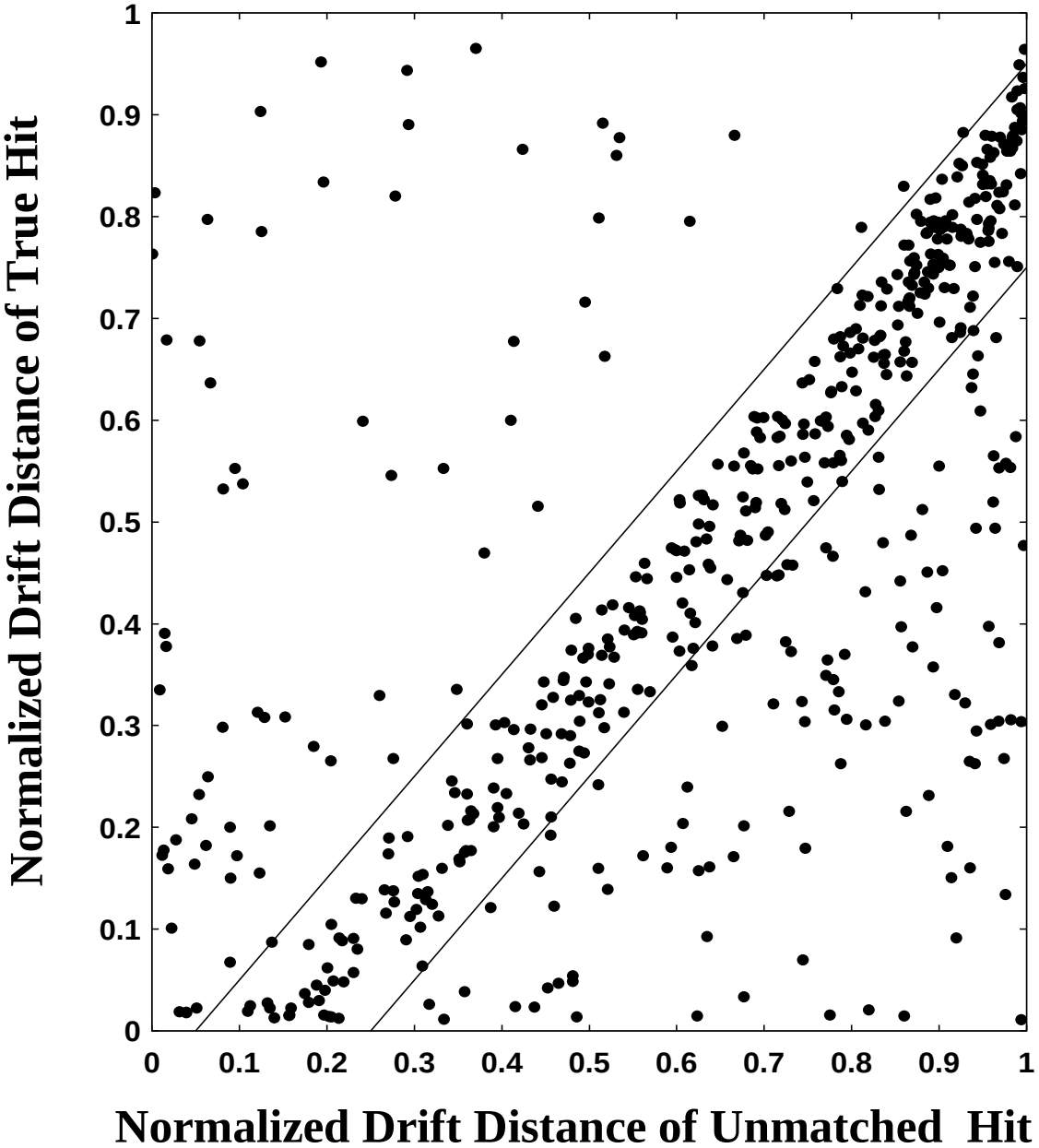


Extra Intime Hits

- **Source of pattern recognition errors**
- **Can be electronics noise or real extra hit (δ−rays)**

Study the distance correllation between good hit and extra hit

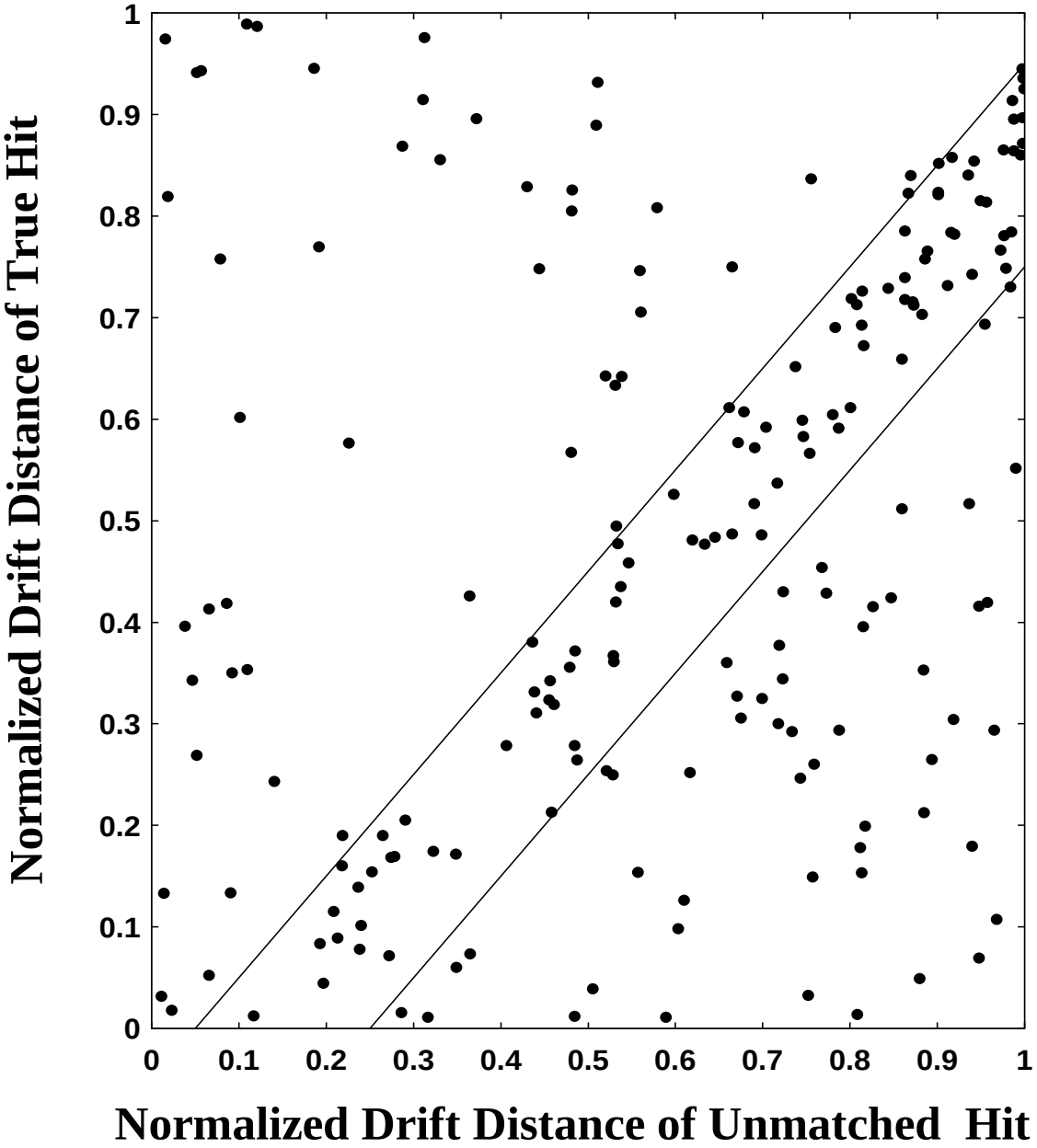
Distance Correlation Between True Hit and Noise Hit



Argon−CO2 with Isopropyl at OC

Rate of Noise Hits: 6.3% per straw layer

Distance Correlation Between True Hit and Noise Hit



Argon−CO2 with Isopropyl at OC

Rate of Noise Hits: 2.5% per straw layer

Future Plans for Cosmic Test Stand

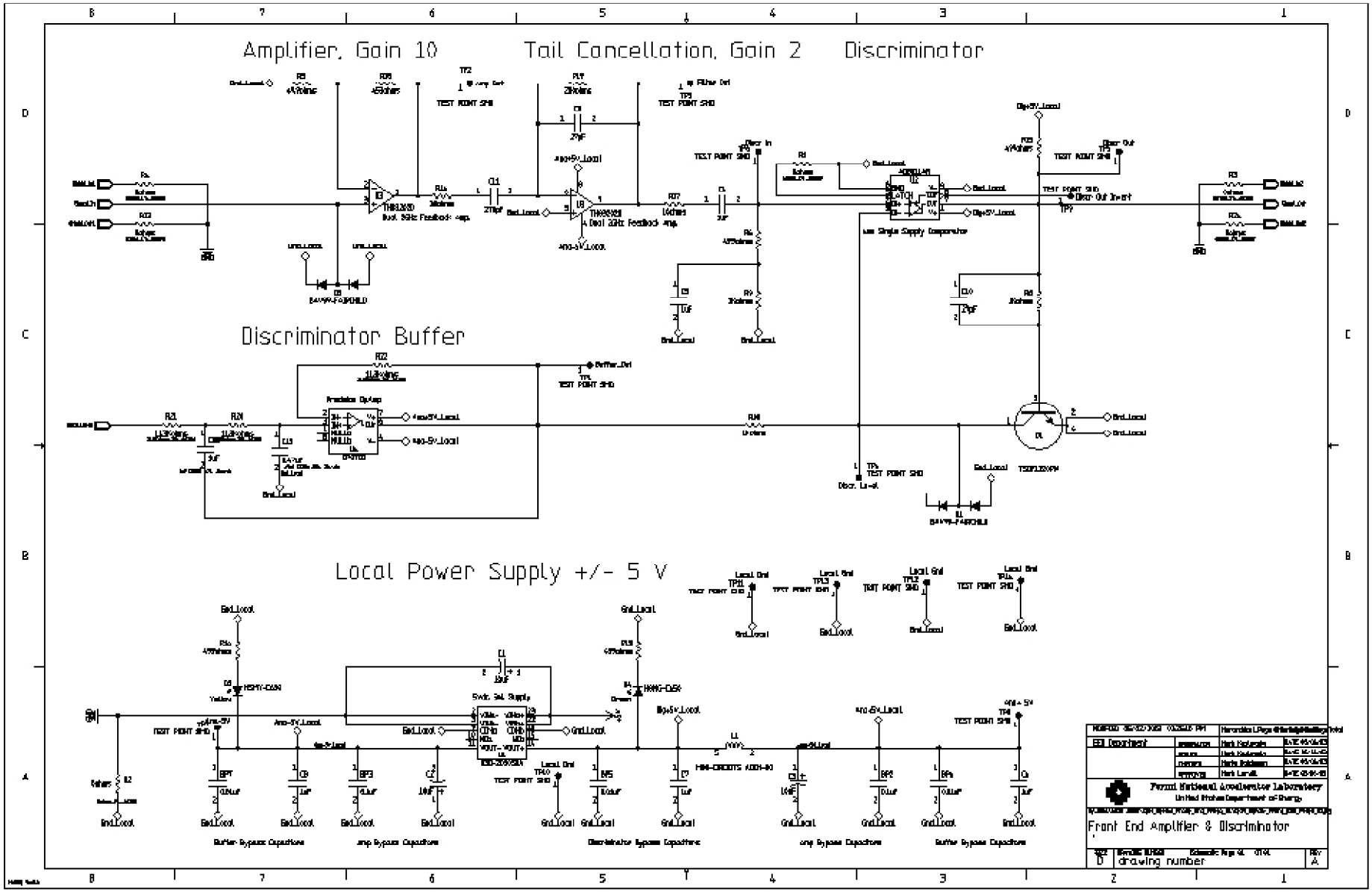
- **Continue data collection and refine analysis to extract other important parameters.**

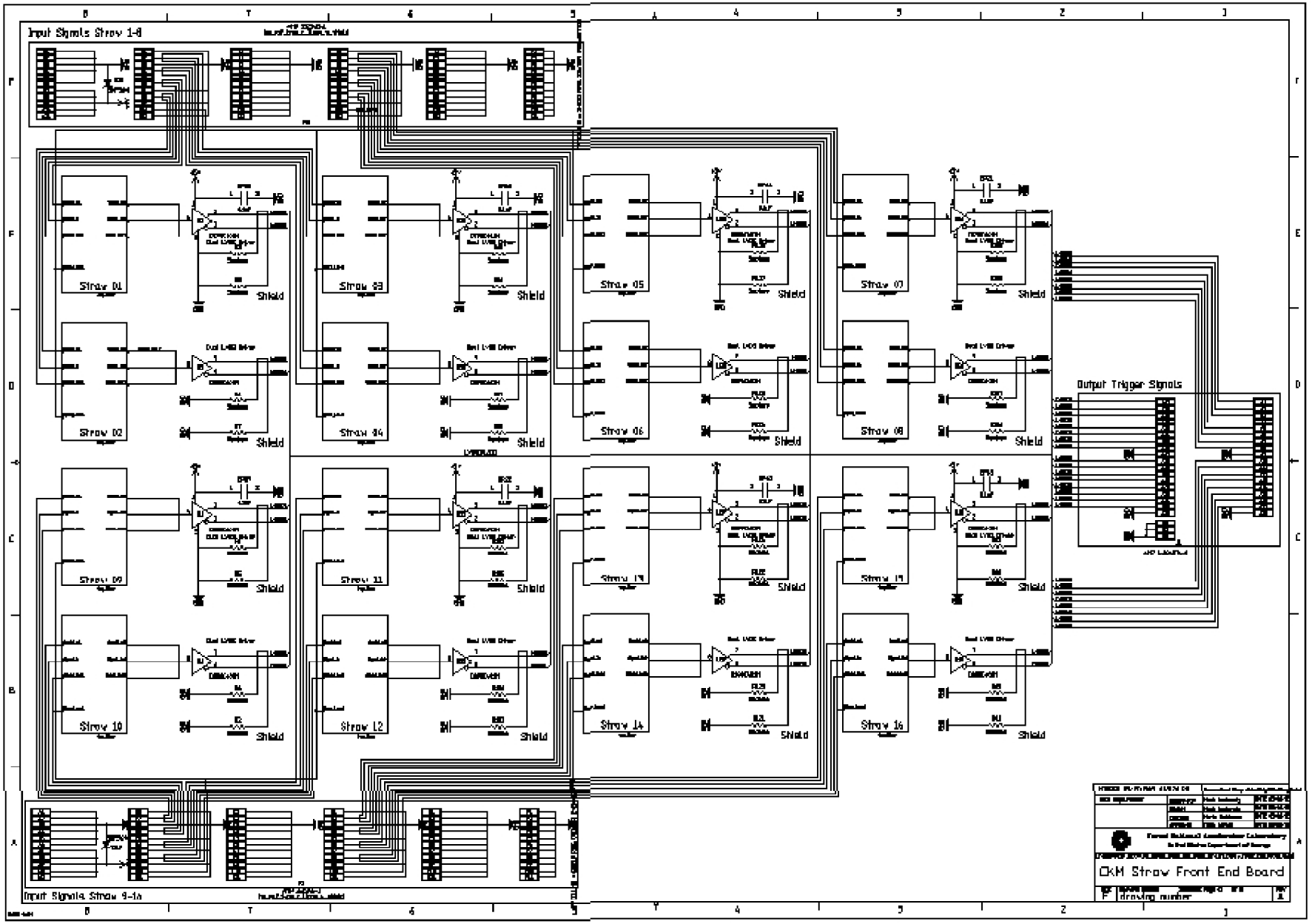
- **Collect data with CF4−Ethane**

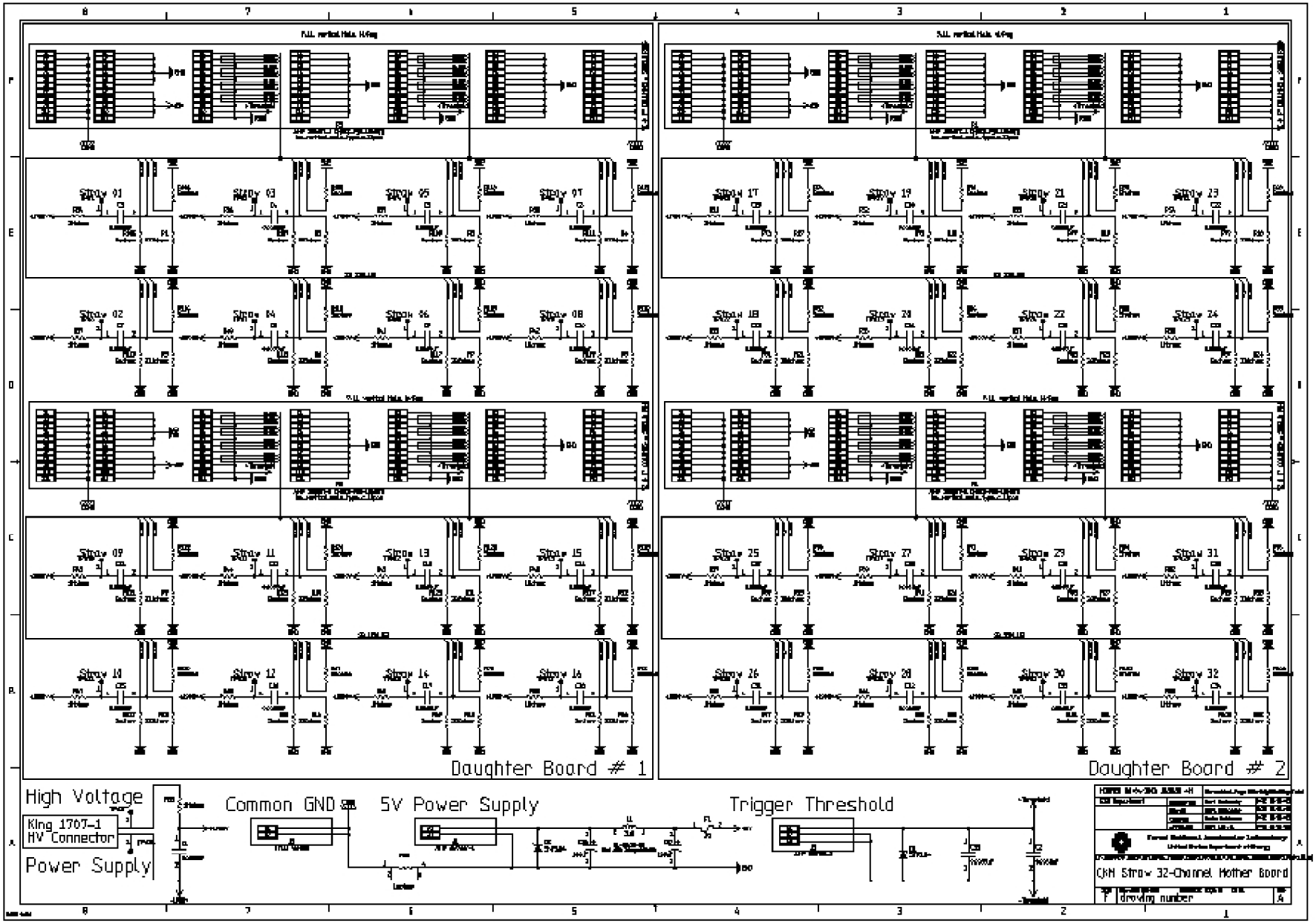
- **Will modify one chamber to receive new front−end electronics designed by Mark Kozlovsky, which have substantive differences from the BNL871 design:**

  Fewer gain stages
  Add hysteresis to discrimination threshold
  More channel−to−channel isolation, including power
  Reduce use of single−ended transmission.
  Use LVDS standard.
  Higher channel count (16) per FE board.
  Mother board to house FE boards.

- **Eventually move to test beam**


Amplifier, Gain 10
Tail Cancellation, Gain 2
Discriminator
Discriminator Buffer
Local Power Supply +/- 5 V
Front End Amplifier & Discriminator
drawing number

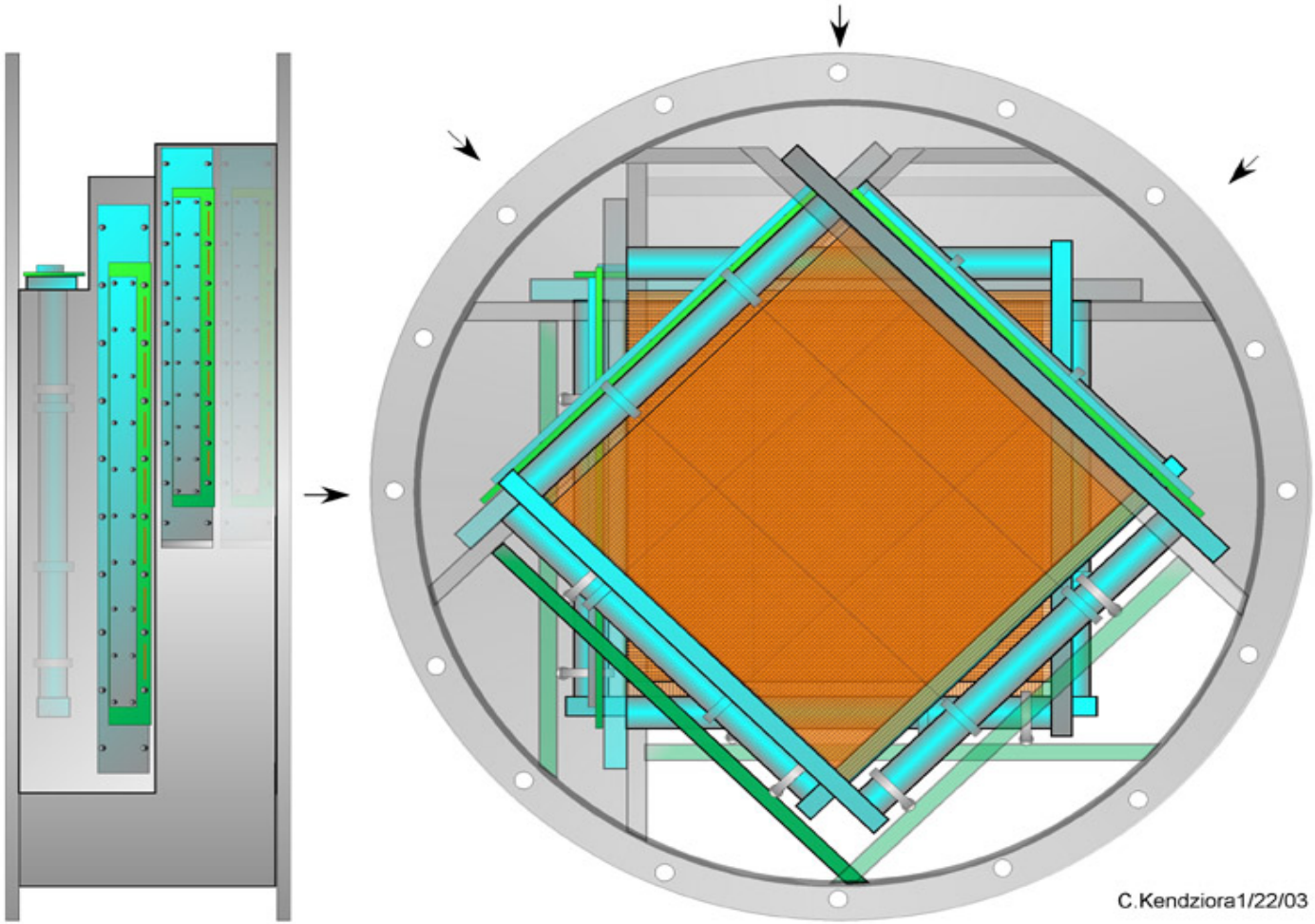

Input Signals Straw 1-8
Straw 01
Straw 02
Straw 03
Straw 04
Straw 05
Straw 06
Straw 07
Straw 08
Straw 09
Straw 10
Straw 11
Straw 12
Straw 13
Straw 14
Straw 15
Straw 16
Shield
Output Trigger Signals
Input Signals Straw 9-16
CKM Straw Front End Board


Daughter Board # 1
Daughter Board # 2
High Voltage
King_1707-1
HV Connector
Power Supply
Common GND
5V Power Supply
Trigger Threshold
CMM Straw 32-Channel Mother Board

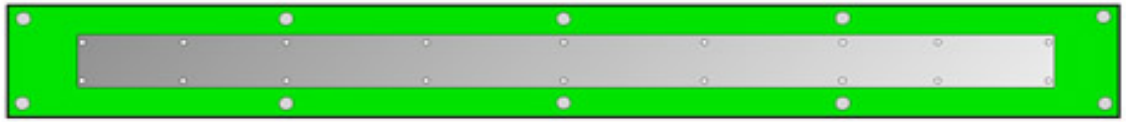
Progress Towards Engineering Design

- **Electronics design is proceeding nicely. Expect prototype PC boards in . . .**

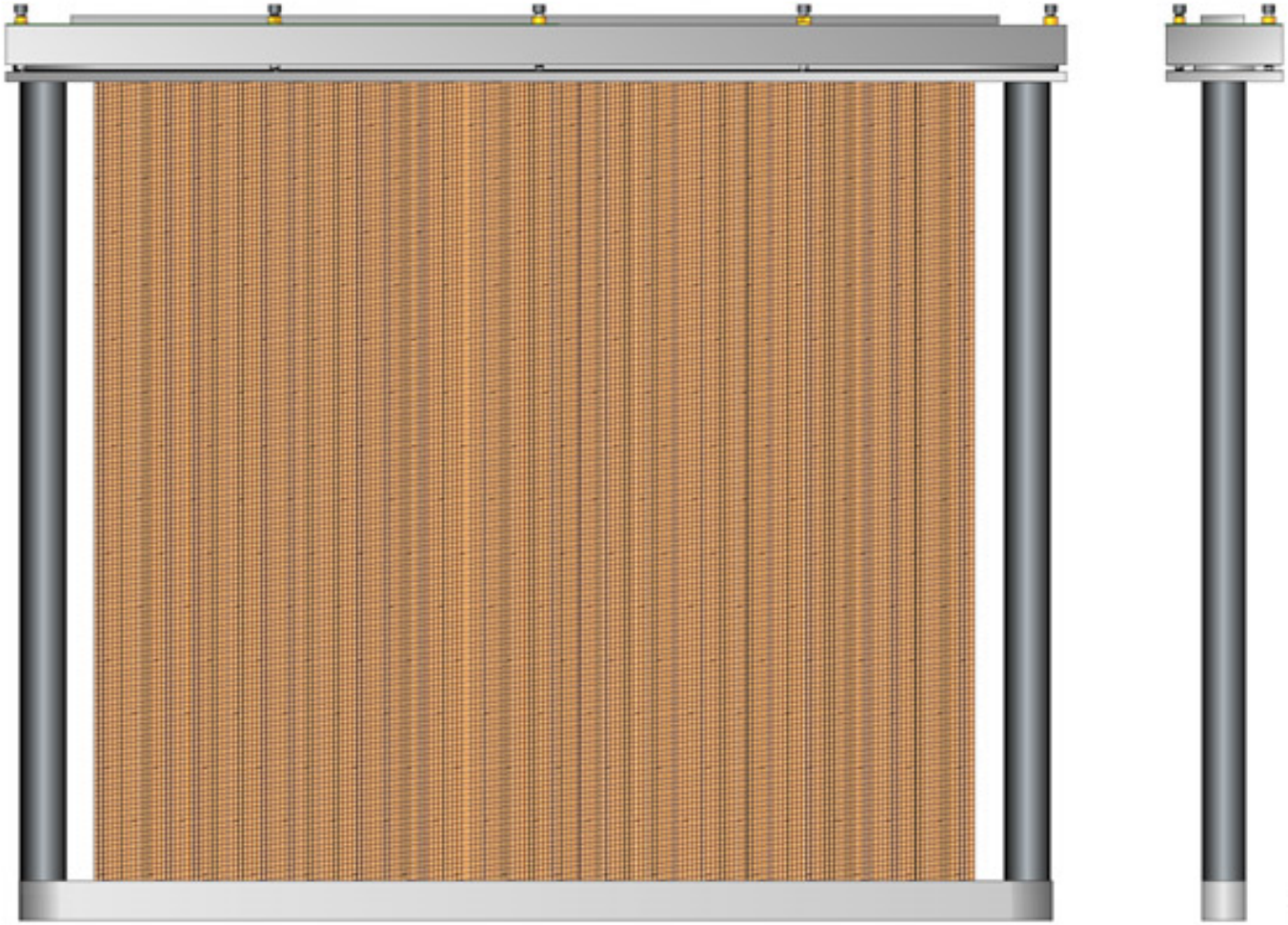
- **Currently, we have a reasonably advanced conceptual mechanical design from Cary.**



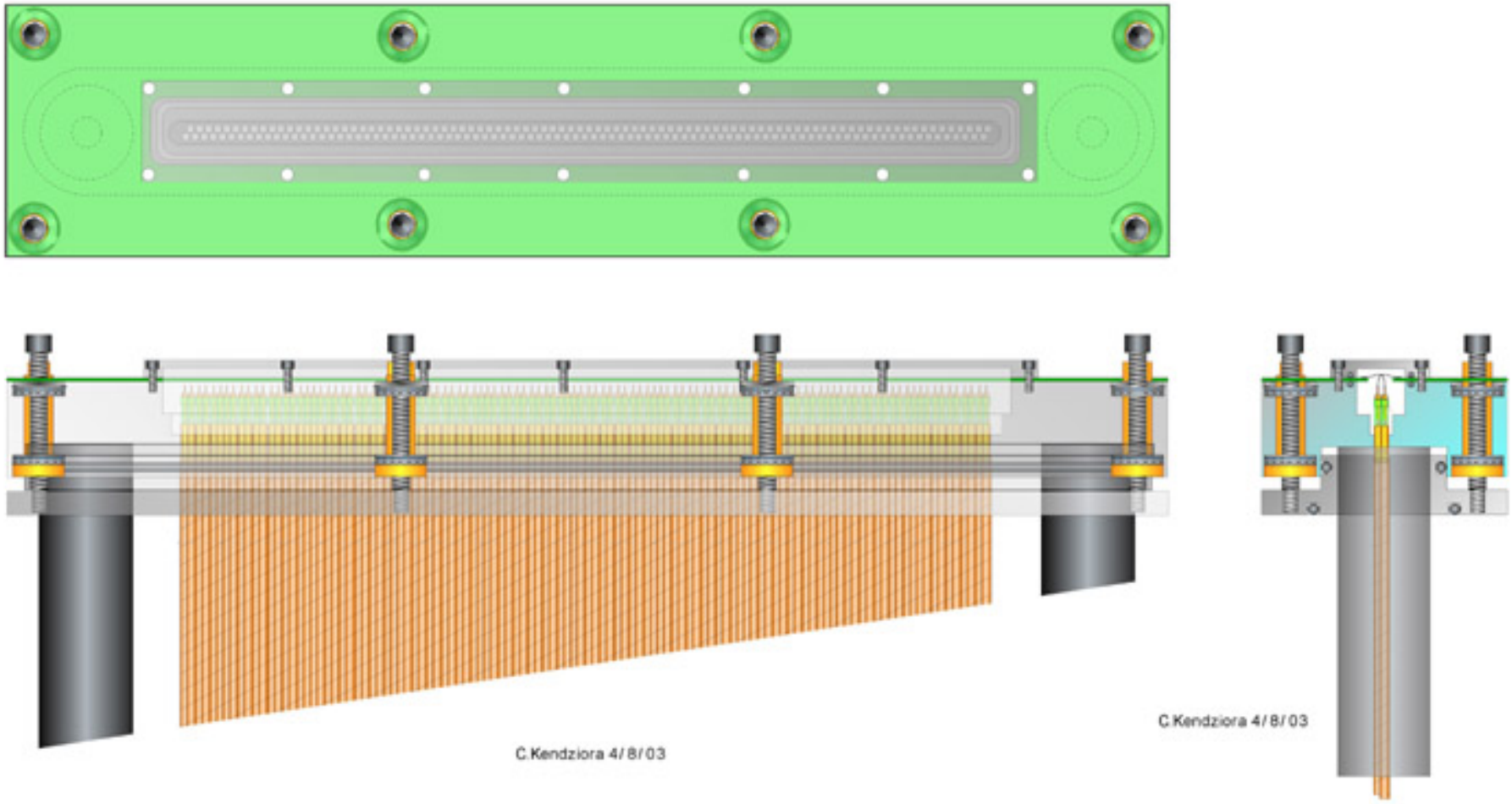
*** Electronics not shown**



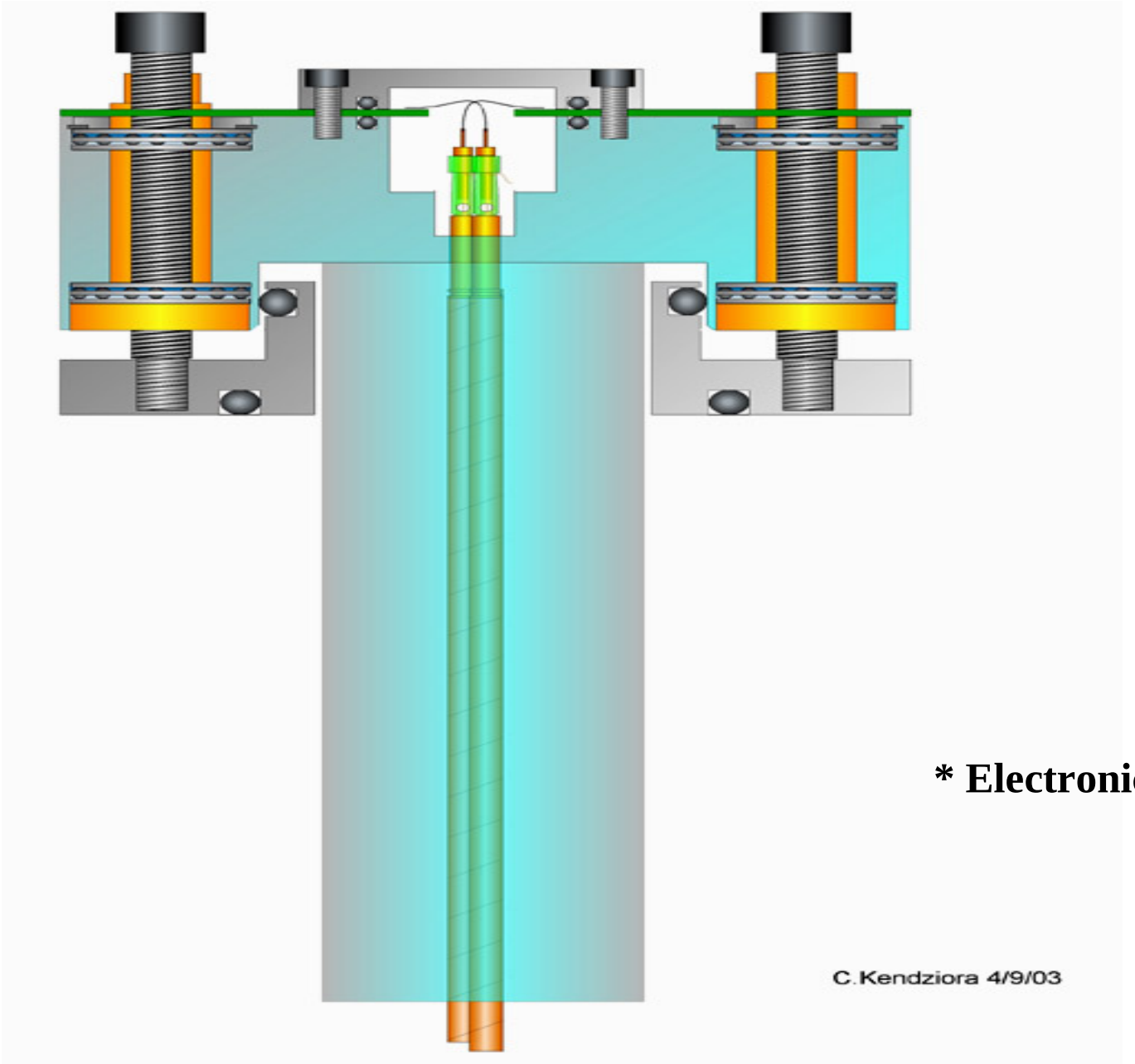
*** Electronics not shown**



C.Kendziora 4/10/03



*** Electronics not shown**



*** Electronics not shown**

Goal for this FY was to have an engineering design of full scale doublet (360 straws). This will be hard to meet for the following reasons:

(1) Finite element analysis is being done for conceptual mechanical design. This is a big job ! Goal of F.E.A.:

- **How much does chamber distort under its own weight and internal tensions (due to straw and wires) ? Order 3 mils is o.k.**

- **How much does vacuum tank distort chamber ?**

(2) We've been slow to be quantitative about how straw would fail (leak)

A leaking straw can:

(1) stop physics running.

(2) potential to damage vacuum turbo pumps

(3) potentially damage a straw plane by causing pressure gradient across straw plane:

2.2 milli−Torr across straw plane will force straw out of position by 100 μm (kills resolution)

44 milli−Torr across straw plane will force straw to hit sense wire

- **We've been doing some crude estimates for various assumed leak rates**
- **We're setting up to measure how a straw might actually leak.**
- **There are several coping mechanisms available: limiting orifices, suitable arrangement of vacuum ports, rapid pump−down of leaking chamber**